

**B. AMENDMENTS TO THE CLAIMS:**

Claims 1-21 have been cancelled.

22. (New) A process for producing ethylene and hexene-1 from a mixed C<sub>4</sub> feed containing butene-1, butene-2, butadiene, and isobutylene, comprising:

- (a) removing butadiene from said feed;
- (b) hydroisomerizing butene-1 to butene-2;
- (c) separating isobutylene from other butenes;
- (d) subsequent to said separation of isobutylene from other butenes, isomerizing butene-2 from step (b) to butene-1;
- (e) subjecting butene-1 from step (d) to catalytic metathesis under conditions and in the presence of a metathesis catalyst to produce a mixed olefin effluent including ethylene, pentene-2, and hexene-3, and wherein said pentene-2 is recycled to said butene-1 produced from step (d) to be subjected to catalytic metathesis;
- (f) fractionating the effluent; and
- (g) isomerizing hexene-3 from step (e) to produce hexene-1.

23. (New) The process of Claim 22 wherein steps (b) and (c) occur simultaneously in a catalytic distillation tower.

24. (New) The process of Claim 22 wherein said butene -1 is at least 90% of said feed.

25. (New) The process of Claim 22 wherein said catalyst is selected from the group consisting of tungsten oxide, molybdenum oxide, rhenium oxide, and mixtures thereof.

26. (New) The process of Claim 25 wherein said catalyst does not include a promoter.

27. (New) The process of Claim 25 wherein said catalyst is tungsten oxide.

28. (New) The process of Claim 27 wherein said catalyst is supported tungsten oxide.
29. (New) The process of Claim 28 wherein said tungsten oxide is supported on a silica support.
30. (New) The process of Claim 22 wherein said hexene-3 is isomerized to hexene-1 at a WHSV of from about 3 to about 200.
31. (New) The process of Claim 30 wherein said hexene-3 is isomerized to hexene-1 at a WHSV of from about 10 to about 60.
32. (New) The process of Claim 22 wherein said hexene-3 is isomerized to hexene-1 at a pressure of from about 2 bar to about 40 bar.
33. (New) The process of Claim 32 wherein said hexene-3 is isomerized to hexene-1 at a pressure of from about 3 bar to about 10 bar.
34. (New) The process of Claim 22 wherein said metathesis in step (e) is effected at a temperature from 250°C to 400 °C.
35. (New) The process of Claim 22 wherein said hexene-3 is isomerized to produce hexene-1 at a temperature of from about 40 °C to about 400 °C.
36. (New) The process of Claim 35 wherein said hexene-3 is isomerized to produce hexene-1 at a temperature of from about 250 °C to about 350 °C.
37. (New) A process for converting butene-1 to ethylene and hexene-1, comprising:
- (a) subjecting a feed comprised of at least 90% butene-1 to catalytic metathesis under conditions and with a metathesis catalyst that produces an effluent

comprising ethylene and hexene-3 to provide a weight selectivity to hexene-3 of at least 40% from butene-1;

- (b) fractionating said effluent from step (a) into at least a first stream containing hexene-3 and a second stream including unreacted butene-1 and an internal pentene olefin;
- (c) subjecting said first stream including said hexene-3 to isomerization to convert said hexene-3 to hexene-1;
- (d) subjecting said second stream of step (b) to metathesis by recycling said second stream to step (a); and
- (e) subjecting the combined effluent from the metathesis of said second stream and the metathesis of fresh feed in step (a) to fractionation in step (b).

38. (New) The process of Claim 37 wherein said weight selectivity to hexene-3 from butene-1 is at least 50%.

39. (New) The process of Claim 37 wherein said catalyst is selected from the group of tungsten oxide, molybdenum oxide, rhenium oxide, and mixtures thereof.

40. (New) The process of Claim 39 wherein said catalyst is tungsten oxide.

41. (New) The process of Claim 40 wherein said catalyst is supported tungsten oxide.

42. (New) The process of Claim 37 wherein the metathesis is effected at a WHSV of from about 3 to about 200.

43. (New) The process of Claim 42 wherein said metathesis is effected at a WHSV of from about 6 to about 40.

44. (New) The process of Claim 37 wherein said metathesis is effected at a pressure of from about 10 psig to about 600 psig.
45. (New) The process of Claim 44 wherein said metathesis is effected at a pressure of from about 30 psig to about 100 psig.
46. (New) The process of Claim 37 wherein said metathesis is effected at a temperature from 250 ° to 400 °C.
47. (New) The process of Claim 40 wherein said catalyst is supported on a silica support.
48. (New) The process of Claim 37 wherein said hexene-3 is isomerized to hexene-1 at a WHSV of from about 3 to about 200.
49. (New) The process of Claim 48 wherein said hexene-3 to hexene-1 at a pressure of from about 2 bar to about 40 bar.
50. (New) The process of Claim 49 wherein said hexene-3 is isomerized to hexene-1 at a pressure of from about 3 bar to about 10 bar.
51. (New) The process of Claim 37 wherein said hexene-3 is isomerized to hexene-1 at a temperature of from about 40 °C to about 400 °C.
52. (New) The process of Claim 51 wherein said hexene-3 is isomerized to hexene-1 at a temperature of from about 250 °C to about 350 °C.
53. (New) The process of Claim 37 wherein said catalyst does not include a promoter.